

### **Remarks**

#### **Status of Claims**

Without prejudice, the Applicants have incorporated the subject matter of Claims 3, 15, and 18 into Claims 1, 12, and 17, respectively, to facilitate an early allowance. Additionally, new Claim 20 has been added which recites essentially the subject matter of former Claim 1 plus a recitation that the impurities in the product stream comprise dichlorodifluoromethane and methyl chloride. Support for these claims can be found on page 1, lines 18-20. No new matter has been added.

#### **Withdraw of Restriction Requirement**

Applicants gratefully acknowledge the Examiner's withdraw of the restriction requirement made on February 6, 2002, thereby rejoining Claims 12-19 in the application.

#### **Matters of Formality**

The Examiner objected to Claims 1-19 for a number of informalities. First, the Examiner objected to Claim 3 line 5 in which states "wherein step of supplying" should be "wherein the step of supplying" since the step is already stated in the base claim. In reply, Applicants submit that this objection is now obviated as this claim has been cancelled and the subject matter has been incorporated into Claim 1.

Second, the Examiner found the term "fluorination" in Claim 3 and the term "said impurity" in Claim 12 to be inconsistent with "fluorination reaction" in Claim 1 and "at least one impurity" recited in Claim 12, respectively. In reply, Applicants have cancelled claim 3 to and amended Claim 12 to read "said at least one impurity".

Third, the Examiner objected to the preamble of Claim 12 stating that it should recite a separation of purification process since there is no “preparing” or reaction recited in the body of the claim. In reply, Applicants have amended Claim 12 to state “a method of purifying difluoromethane”.

Fourth, the Examiner objected to the term “said device” in Claim 19 as it lacks antecedent support. In reply, Applicants submit that claim 19 has been cancelled thereby obviating the rejection.

Fifth, the Examiner objected to Claim 17 line 19 as reciting process rather than structural limitations. In reply, Applicants have amended the claim to emphasize the structural aspects that facilitate the process steps.

Sixth, the Examiner objected to the phrase “adapted to” which is recited in Claim 17. In reply, Applicants have deleted this terminology from the claim.

### **Prior Art Rejections**

The Examiner rejected Claims 1 and 4-7 under 35 U.S.C. §103(a) as being unpatentable over WO 99/07660 in view of Dattani et al. (U.S. Patent No. 5,200,431) or Tsuda et al. (U.S. Patent No. 6,346,172). Without addressing the merits of this rejection, the Applicants have opted to incorporate the subject matter of Claim 3 into Claim 1 to facilitate an early allowance of the claims. Applicants submit that the claims are now in condition for allowance.

### **Allowable Subject Matter**

The Examiner found Claims 3, 8-11, 15, 18-19 to be allowable if rewritten in independent form including all the limitations of the base claim and any intervening claims. In reply, Applicants have incorporated the subject matter of Claim 3 into Claim 1 and the subject

matter of Claim 15 into Claim 12, and the subject matter of Claim 19 into Claim 17. Therefore, Applicants respectfully submit that Claims 1, 8-11, 12, 16-17 are in condition for allowance.

### **New Claim 20**

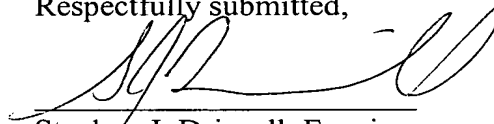
Applicants submit that the new Claim 20 is also in condition for allowance and is patentably distinct over WO 660. Specifically, although WO 660 discloses the use of dichloromethane as an extractive agent in the production of difluoromethane, the disclosure does not specifically address the use of this extractive agent in removing dichlorodifluoromethane and methyl chloride from the product stream. Indeed, nowhere in WO660 is the difficulty in removing dichlorodifluoromethane and methyl chloride from difluoromethane acknowledged. To the contrary, WO 660 focuses instead on the removal of the impurities of CFC-12, HFC-143A, CFC-115, and HFC-125 from difluoromethane. The reference describes the difficulty of removing CFC-12, HFC-143A, CFC-115, and HFC-125 from difluoromethane due to the azeotropes they form with difluoromethane, but is silent with respect to the azeotropes formed between difluoromethane and dichlorodifluoromethane and methyl chloride. Although WO660 addresses these impurities with respect to the extractive agent n-hexane in Examples 1 and 2, their azeotropic tendencies with difluoromethane are not discussed.

It is well established in US Patent law that, when considering the invention as a whole, the Examiner must consider the discovery of the problem as being part of the invention. Here, the Applicants have recognized that dichlorodifluoromethane and methyl chloride are particularly difficult to remove from a difluoromethane stream as they form an azeotrope with difluoromethane. It is well known that azeotropes are very difficult to separate via conventional distillation. The Applicants have found, however, that the relative volatilities of these components can be altered by the introduction of dichloromethane in the distillation column as an extractive agent. More specifically, the mixture of difluoromethane and

dichloromethane exhibits non-ideal behavior according to Raoult's Law such that an increase in the concentration of dichloromethane results in a less-than-expected reduction in the mixture's volatility. Dichloromethane does not exhibit, however, the same non-ideal behavior with dichlorodifluoromethane and methyl chloride. Therefore, an increase in the relative volatility between difluoromethane and dichlorodifluoromethane and methyl chloride can be effected by the addition of dichloromethane. The increase in relative volatility, in turn, provides for more effective and efficient distillation. Thus, the invention of claim 20 entails both the recognition of the problem of separating dichlorodifluoromethane and methyl chloride from difluoromethane, and the discovery of using dichloromethane as an extractive agent to remove these impurities. Accordingly, Applicants respectfully submit that the claims be allowed.

In light of the above remarks, an early and favorable response is earnestly requested.

Respectfully submitted,



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